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# SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE •



MAY 26, 1934

The Sea Enters to Yield Its Wealth

See Page 330

A

SCIENCE SERVICE PUBLICATION



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Summary of Science

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## SCIENCE SERVICE

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## DO YOU KNOW?

For all his thick skin, an elephant is very sensitive to cold.

The sacred lotus of the Nile was a white water-lily that bloomed at night.

A daily newspaper in Braille raised type for the blind will be printed in France.

Corinth has an earthquake-proof museum, to house the art treasures salvaged from its ruins.

There are about 600 species of mushrooms in the United States, of which about 20 are poisonous.

The blood in Egyptian mummies 5,000 years old can be classified by the same blood tests used in living persons.

Reversing the wild western practice, an exhibit at the Century of Progress will introduce a gun that shoots on the lights.

Russian scientists, having found vitamin C in pine wood, are now preparing pine jams and liquors to test their value in preventing scurvy in the far north.

Two caps on a milk bottle keep out more contamination than one cap.

Paper collars are now being made either soft or stiff, and they are said to be remarkably wilt-proof.

A way of packaging cheese in tin cans which permit the cheese to ripen in the can has been evolved.

If pink and bronze chrysanthemums are forced to bloom ahead of normal time, by shortening their exposure to daylight, the blossoms are paler.

Mauna Loa, the Hawaiian volcano, has staged 23 summit eruptions since 1843, in addition to numerous flank eruptions.

Seminole Indians have turned showmen, and tourists in Florida now find the sign "Indian village, admission 15 cents" before small groups of Seminole homes.

The hemlock tree is not poisonous, the "hemlock" poison made famous by Socrates being derived from a plant similar to the wild carrot and containing poison in root, stem, leaf, and seed.

## WITH THE SCIENCES THIS WEEK

## AGRICULTURE

How much wheat are we likely to have left this year? p. 334.

## ASTRONOMY

By how much will the 200-inch telescope enlarge our available sample of the universe? p. 333. *Solar Clusters*—Harlow Shapley—McGraw-Hill, 1930, \$3.

Who discovered the first known moons of Jupiter? p. 324. *Astronomy*—H. N. Russell, R. S. Dugan and J. Q. Stewart—Ginn, 1926, 2 vol., \$4.96.

Why is air cooling advantageous for a telescope? p. 325.

## AVIATION

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Why does irradiated milk keep longer than untreated milk? p. 329.

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From what is salt water soap made? p. 327. What chemical is used to induce the sea to part with its bromine? p. 330.

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## GENERAL SCIENCE

What scientists were honored by Franklin Medals? p. 333.

## MEDICINE

Are adults generally infected with the tuberculosis germ? p. 332. Can a person eating an ordinary diet develop pellagra? p. 328.

How is ionization produced within the body? p. 323.

In what way are insect powders like ragweed? p. 329. *Ashtma, Hay Fever and Related Disorders*—Samuel M. Feinberg—Lea and Febiger—1934, \$1.50.

What vitamin aids the battle against tuberculosis? p. 329.

Why do mentally diseased persons not suffer when they have pneumonia? p. 326.

## PALEONTOLOGY

What was the largest land mammal? p. 328. *Vertebrate Paleontology*—A. S. Romer—Univ. of Chicago, 1933, \$5.

## PHARMACOLOGY

What is the danger of varying strength in a medicine? p. 323.

## PSYCHIC RESEARCH

How are photographs of spiritualistic seances obtained? p. 325.

## VETERINARY MEDICINE

What vaccine is important to Arctic transportation? p. 328.

## ZOOLOGY

Do gorillas have twins? p. 327. *The Great Apes*—Robert M. Yerkes and Ada W. Yerkes—Yale, 1929, \$10.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but the references for further reading. Books cited can be supplied at Book Department, Science News Letter, at publishers' prices, postpaid in the United States.



## MEDICINE

# New Treatment Aids Hopeless Cancer Patients; Not Cure

British Physician Reports Very Favorable Results With Combination of Sulfur Selenium Colloids, Radium, X-Rays

A NEW treatment for cancer devised by a British physician has given relief to some cancer patients whose cases were called "hopeless." It cannot be called a cure, since it has not been used long enough for physicians to know what the ultimate results will be.

The new treatment reduces pain and discomfort and often enables patients who entered the hospital complete and hopeless invalids to return, for a time at least, to their normal life. It was devised by Dr. A. T. Todd, physician to the Bristol Royal Infirmary, who reported results with it in the current issue of the *British Journal of Surgery*.

Dr. Todd uses a new medicine known as a sulfur-selenium colloid and another colloid of selenium which is combined with radium substances so that it is slightly radioactive. The first medicine is called SSe for short, and the second is abbreviated as R. A. S.

## Alive After Years

In a large number of instances the patients treated by this method have become apparently well and are still alive more than a year after the beginning of the treatment, which was little used before 1931. Two cases are alive after 2½ and 4 years respectively.

Dr. Todd first ascertains that all other types of treatment (surgery, X-rays and radium) have failed, that the diagnosis of cancer is certain and that the patient is willing to cooperate by having regular treatment for a period of years if necessary. He then starts by injecting into a vein 4 cubic centimeters or about 1 teaspoon of SSe. After 48 hours powerful X-rays are trained on the growth.

The doses of SSe followed after 48 hours by X-radiations are given weekly for 8 to 14 weeks. When the position of the cancer is such as to make the patient highly sensitive to treatment the dose is cut in half. By spreading the dosage of X-rays over a longer period than the normal 8 weeks, when neces-

sary, care is taken to avoid too marked a reaction.

After this preliminary course, in which the selenium is gradually ionized, that is, changed in its electrical properties by the X-rays, the regular treatment is begun. For the first three weeks doses of R. A. S. are given at weekly intervals; thenceforward the doses of R. A. S. are given alternately with SSe, each every two weeks. The R. A. S. is believed to act in the same way as the X-rays, though on a much smaller scale, in ionizing the selenium colloid.

## Believes Cancer Infectious

Dr. Todd believes this ionization to be an important part of the treatment, which is considered to act as a stimulant to the body's defensive mechanism against cancer, and not to have any direct effect on the growth. He has developed an ingenious theory as to the nature of this mechanism, and considers that cancer is an infectious disease.

If the patient's condition appears to improve, the alternate injections of the two colloids are continued regularly and are stopped only when the cancer

symptoms have disappeared. But when the treatment is unsuccessful the "preliminary" combination of SSe with X-rays is repeated after a three-month interval.

Insufficient time has elapsed to show whether this new method may sometime provide a complete cure for cancers otherwise incurable.

*Science News Letter, May 26, 1934*

## PHARMACOLOGY

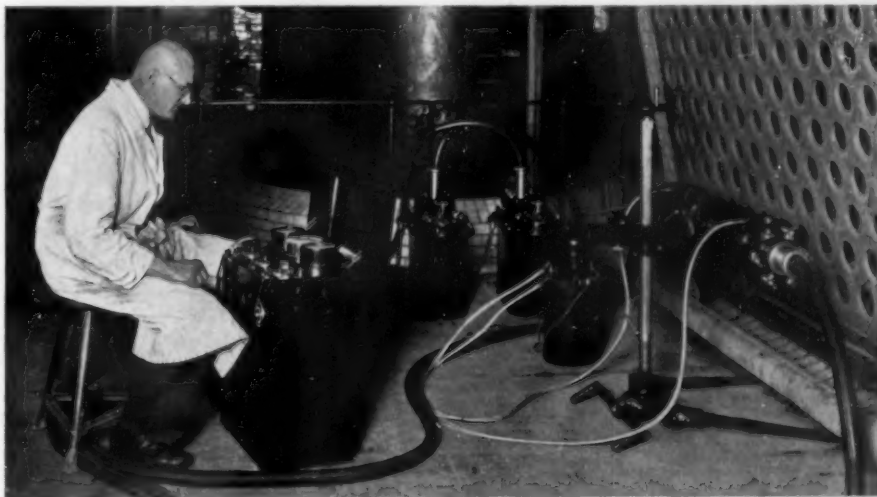
## Simple New Test For Sleeping Powders

MODERN sleeping powders and pain-relieving drugs of the barbiturate group, such as veronal and amytal, may be more reliable in their action and danger of accidental overdosage may be eliminated in the future. A simple test for determining the strength of these preparations has been developed by James M. Dille of Georgetown University School of Medicine.

This means that for the first time manufacturers have a convenient means of standardizing their preparations of such medicines, Mr. Dille explained in reporting his test to the American Pharmaceutical Association. At present the strength of these drugs varies considerably and one dose may contain much more or much less of the active pain-relieving or soothing substance than the physician intended his patient to have.

*Science News Letter, May 26, 1934*

The *Thurberia weevil*, a new pest of western cotton, is said to be able to stand both heat and cold, so that it can thrive in a climate fatal to boll weevils.



## TESTING STEEL

This small and portable X-ray apparatus was devised in Germany for the convenient testing for flaws of plates of steel. It has a potential of 200,000 volts and an output of eight milliamperes. Cables and all other parts are thoroughly insulated for safety.



## ASTRONOMY

# Tenth Moon of Jupiter May Have Been Found

**Lick Observatory Reports Photograph of Faint Object Near Great Planet Having Motion Like Eighth Moon**

**T**HE DISCOVERY of what may prove to be the tenth satellite of the planet Jupiter was made at Lick Observatory when Dr. H. M. Jeffers of the observatory staff noticed a very faint heavenly object that has the same motion in the sky as the eighth satellite which he was photographing.

Dr. R. G. Aitken, director of Lick Observatory, wired Harvard College Observatory, the collecting center for astronomical information in this country, whence details of the observation are sent to other astronomers here and abroad. Other observatories will join in the study.

It is by no means certain that the object observed is a new and tenth satellite. Dr. Aitken simply announced the photographing of a faint object near Jupiter having daily motions similar to that of satellite eight. Its nature is still uncertain. More photographs are being secured to permit computations to decide whether the object is satellite nine of Jupiter, a new tenth satellite or a minor planet or asteroid of unusual orbit.

## Very Faint

The new object is very faint and will be observable only in the largest telescopes. It is of the nineteenth magnitude, which is close to the limit of visibility.

This Jupiter's tenth satellite, if that is what it proves to be, will be one of a trio of extremely remarkable objects in the solar system, the three most recently discovered moons of Jupiter. These outer satellites move around the planet with what is called a retrograde motion, a direction opposite that of the seven inner satellites. The new object is probably only a few miles in diameter and it may be even smaller than the eighth satellite, the diameter of which is estimated at 25 miles.

Jupiter is the fifth planet from the sun and the second outward from the earth. It is the largest in diameter and, with ten satellites, it would have a greater number than any other planet.

During May Jupiter is a prominent object in the evening southern sky.

The astronomical position of the new object as of May 9.23 was right ascension 13 hours 8 minutes and 21.3 seconds; declination south 4 degrees six minutes 26 seconds. Its daily motion is 21 seconds west and one minute 20 seconds north.

## Fifth Such Discovery

If the discovery by Dr. Jeffers proves to be the tenth moon of Jupiter, Lick Observatory will have continued almost a monopoly on such discoveries in modern times.

The first four satellites can be considered the first heavenly bodies discovered. Galileo saw them in 1610 when he turned his telescope toward Jupiter. The late Edward E. Barnard discovered the fifth at the Lick Observatory in 1892, and since then the Lick astronomers have contributed the sixth, seventh, ninth and tenth. The eighth was picked up by Dr. P. J. Melotte from the British Royal Observatory at Greenwich in 1908.

Dr. Jeffers' discovery was made in exactly the same manner as that of the ninth satellite in 1914. Dr. Seth B. Nicholson, now of the Mt. Wilson Observatory but then a graduate student at the University of California, was completing the studies required for his doctor's degree at the Lick Observatory. With the 36-inch Crossley reflector he photographed the eighth satellite. When he examined his plates, he found not only the eighth, but another object, which seemed to be moving in just the same way. On a single plate, the satellite looks exactly like the stars in the background, but by comparing several negatives taken at intervals, the moving objects are revealed. The motion of the strange body readily distinguished it from the stars which could be seen on the same plates. This object proved to be satellite number nine. Early this month Dr. Jeffers was photographing the eighth satellite with the same telescope, and his plates also re-

vealed another object moving along with it. Other photographs were made to confirm his discovery, and it will soon be possible to tell whether the new object is really a tenth moon. It may be a minor planet of unusual orbit.

Like numbers eight and nine, the new object seems to move around the planet backwards. That is, the first seven satellites all move around Jupiter from west to east, in the same direction that the planet moves around the sun, the same as the earth moves around the sun and as the moon moves around the earth. But moons eight, nine and ten of Jupiter all move around it from east to west, the astronomer calls this a "retrograde" motion.

Although Galileo Galilei, who was one of the first astronomers to use a telescope, saw the first four satellites when he turned his tiny instrument towards Jupiter in January, 1610, a German astronomer, Simon Marius, had seen them the previous year, but apparently had not realized what they were until after Galileo announced his discovery.

These four moons are bright enough to be seen easily in a very small telescope and it is interesting to watch them night after night, and to see their different positions as they revolve around the planet.

The smallest is about 2,000 miles and the largest about 3,500 miles in diameter. The fifth satellite, which Barnard discovered with the 36-inch refractor in 1892, is closer to the planet than any of the others, and is probably only about 100 miles in diameter. It revolves around the planet in 12 hours, faster than any of the others.

## Recent Ones Small

Dr. Charles D. Perrine, now director of the Argentine National Observatory, discovered numbers six and seven in 1904 and 1905, again at Lick Observatory. These, like numbers eight, nine and ten, are all very small, probably ranging in diameter from 15 miles to 100 miles.

Further observations of the tenth moon, if such it proves to be, will be required before astronomers can determine how far it is from the planet, or how rapidly it is moving.

A tenth moon will give Jupiter the largest known family of moons. Saturn, also with nine at present ties it.

In the opinion of many astronomers, Jupiter probably has several other moons, even smaller, which may be detected as larger telescopes are used.



## ASTRONOMY

# Most Modern Telescope Taking First Looks at Sky

**New Instrument of U. S. Naval Observatory Has 40-Inch Mirror With Special Curves and Is Air-Cooled**

THE WORLD'S most modern telescope is now peering at the stars from the U. S. Naval Observatory, Washington, D. C.

With its great 40-inch diameter mirror fashioned to special curves devised by its maker, George W. Ritchey, this telescope will photograph a larger sky area than some telescopes that have larger mirrors.

Mr. Ritchey and his assistants are now engaged in making test photographic exposures to determine just how the new instrument performs. The telescope is designed especially for photographic observation.

Capt. J. F. Hellweg, superintendent of the U. S. Naval Observatory, considers that the telescope is now complete and he expects that it will soon go into active service adding new knowledge to astronomy.

It is the first air cooled telescope. This most modern accessory is not for the comfort of the astronomers who will use the telescope, but to assure better observations.

The entire observatory building is built of very light metal, with double walls, so that at night the temperature will soon become the same as the surrounding air. With more massive buildings, the stone and brick absorb heat all day, and give it off long into the night, producing objectionable air currents which spoil the clearness of the telescopic images. In order to keep the telescope at its night time temperature, a felt canopy will be placed over it in the daytime. This is connected with air cooling equipment, so that all day the telescope will be kept at the temperature expected that night.

The entire tube of the telescope is constructed with a unique system of counterpoises, so as to prevent bending. Convenience of the observer is also remembered, as he is provided with a movable observing platform which automatically keeps him at the eyepiece as the telescope turns to compensate for the rotation of the earth. Thus he does not need to interrupt his work fre-

quently to adjust himself.

The curves to which the mirrors are ground are novel. In a reflecting telescope the light from a star falls on a large concave mirror. It is then reflected to a smaller convex mirror above, thence back, through a hole in the large glass mirror to the eyepiece or photographic plate. With conventional reflecting telescopes, the large mirror is ground to the shape known as a paraboloid. Such a shape has the disadvantage of a very small field, that is, the star at which the telescope is directly pointed may be focused sharply, but others nearby are fuzzy. In astronomical photography it is desirable to have stars focused sharply over a larger area, and this can be accomplished by grinding the mir-

rors to new curves. These have been developed by Mr. Ritchey in collaboration with Henri Chrétien, French optician, and so the new instrument is known as the Ritchey-Chrétien telescope. The Naval Observatory installation is the second to use these curves. Several years ago, while in France, Mr. Ritchey constructed one with a 20-inch mirror, which is now in the possession of the Duc de Gramont.

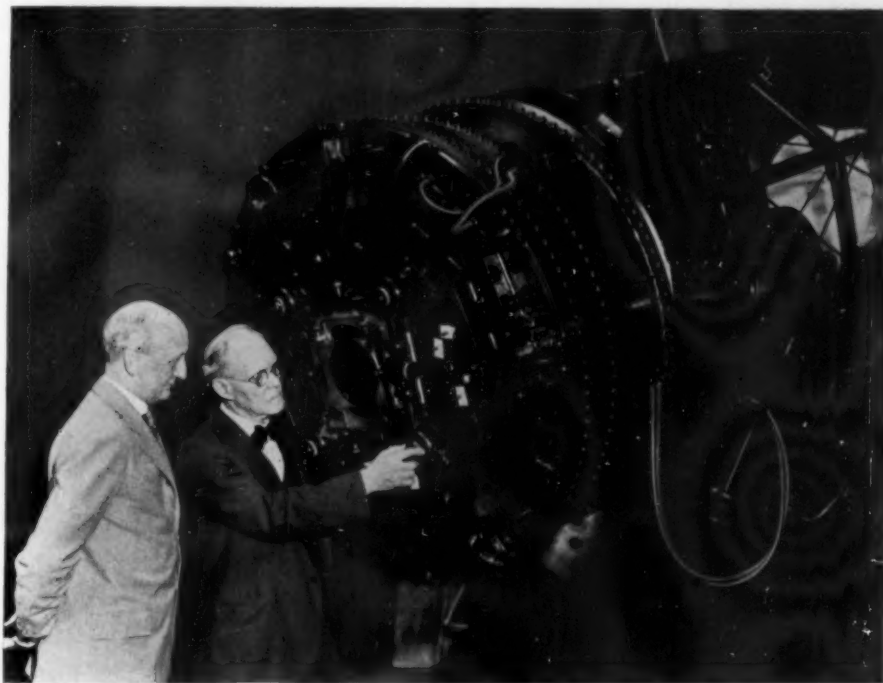
*Science News Letter, May 26, 1934*

## PSYCHIC RESEARCH

## Medium's "Force" Fails To Photograph in Infrared

IF THERE is a mysterious "force" which manifests itself when a medium goes into a trance, it has eluded the keen eye of infrared or heat rays.

To test the psychic powers of Rudi Schneider, well-known medium, two British investigators have made a series of experiments using an infrared light beam and also a camera installed with a movie film sensitive to infrared. The camera thus equipped is capable of taking pictures in feeble red light or even in the absence of visible light, thus



**WORLD'S MOST MODERN TELESCOPE**

George W. Ritchey lovingly adjusts the new great 40-inch telescope that he has labored three years to build for the U. S. Naval Observatory at Washington, D. C., while Capt. J. F. Hellweg, Superintendent of the Observatory looks on. The 40-inch mirror contained within the great bolt-studded base is fashioned to special curves devised by Mr. Ritchey. Although there are larger telescopes, this telescope will photograph a larger sky area than some telescopes with larger mirrors. It is about to go into service photographing the sky. It is the first air-cooled-telescope. A felt canopy above shrouds it during the day and air cooling equipment keeps the telescope at night temperatures so that the delicate mirror will not be distorted.



working in conditions of light that mediums usually prefer for their sittings.

Preliminary announcement of their findings is made to the scientific journal *Nature* by the investigators, Theodore Besterman and Oliver Gatty of the Society for Psychical Research in London, England.

The infrared film caught nothing unusual except the moving of a curtain.

When a beam of infrared light was used in connection with apparatus in the tests, there were frequent announcements by the trance personality that the "force" had entered the ray. Notwithstanding this, the two investigators

could obtain no evidence of absorptions of a beam of the infrared light.

While in a trance, the medium on several occasions announced that the "force" had gone into one of a pair of cotton-wool covered boxes and remained there for some fifteen minutes, but no change in temperature of the box could be detected.

During half an hour, the "force" could produce no significant difference in rate of growth of two strains of bacilli or of dormant yeast.

The investigators spoke highly of Mr. Schneider's willingness to submit to tests and control.

*Science News Letter, May 26, 1934*

#### MEDICINE

## Pneumonia Cough Declared Not Useful in Fighting Disease

**T**HE FREQUENT and violent cough typical of uncomplicated cases of pneumonia is neither useful nor ultimately helpful, as has been generally supposed, declared Dr. Arthur J. Hall, emeritus professor of medicine at the University of Sheffield and visiting physician to the South Yorkshire Mental Hospital, in a report to the *British Medical Journal* published in London.

This cough, instead of acting as a natural means of combating the disease, merely exhausts the patient, Prof. Hall concluded from a study of pneumonia in patients suffering from mental disease. He found that these patients may sometimes have pneumonia without any cough at all.

The general distress and the restless, sleepless nights typical of pneumonia were also absent in patients he observed, although they had fever, chest signs and other symptoms of the disease as do mentally sound persons.

In one of several similar cases a man of 62, suffering from chronic dementia, had an attack of pneumonia lasting a week; his temperature, ranging from 102 to 105 degrees Fahrenheit, the pseudo-crisis on the fifth day, and the crisis on the seventh day, were quite typical of the disease, from which he recovered. The man suffered no pain, had no sputum or delirium, and slept for seven hours each of the seven nights.

Prof. Hall believes that the absence of distress from the pneumonia in these

cases is due to the failure of the higher nerve-centers to register and respond to the disturbing stimuli, perhaps sometimes because there is actual deficiency of available receptive material and sometimes because this material is fully occupied in dealing with other and stronger stimuli. These theories he applies also to other combinations of physical and mental disease.

*Science News Letter, May 26, 1934*

#### PUBLIC HEALTH

## Measles Epidemic Broke Record

**M**EASLES has broken a twenty-one-year record. The number of cases reported each week has been higher than at any time since the U. S. Public Health Service began keeping records of this disease in 1912.

The epidemic has just begun to abate, less than 30,000 cases being reported weekly now. At the peak of the epidemic, during the first week in April, 35,000 cases were reported by state health officials to the U. S. Public Health Service in Washington, D. C.

*Science News Letter, May 26, 1934*

Until five years ago, Bermuda depended entirely for fresh water on rain water or imported supplies from New York; now a method of collecting the underground fresh water, free from salt and made soft, has been evolved.

#### AVIATION

## Sound Echoes Tell Height Of Airplane Above Ground

**F**EAR OF running aground in a fog, long known as one of the greatest terrors of air traffic, may be slated for the discard. The acoustic altimeter, new gadget for the pilot's instrument board, answers the question: How far are we from the cruel earth?

A new type of altimeter developed by Lieut. Leo P. Delsasso, U. S. Naval Reserve, gives a continuous succession of red flashes, each marking on a dial the exact height of the airplane from the earth at the moment of observation. Lieut. Delsasso, who is also physicist in the University of California at Los Angeles, measures distances as near as four feet and as far as seven hundred with great accuracy. With projected improvements a range of fifteen hundred feet or more is expected. Heretofore such instruments have usually been telephonic devices requiring constant listening and some calculation, possibly with the necessity of pistol shots to furnish intense sounds. Other altimeters are merely barometers, which tell distance from sea level. Unfortunately the sea is not usually the place the aviator is worried about.

In the Delsasso altimeter a hammer strikes a steel diaphragm, sending down a short sound wave train of high intensity, and at the high treble pitch of 2000 vibrations per second. The echo returning from earth is caught by a selective microphone tuned to the 2000 frequency. A bouncing contact on the receiving diaphragm, assisted by vacuum-tube amplification, flashes a neon lamp revolving at precise speed around a dial. The time of the round trip of the sound is read directly on the dial, not as time but in terms of distance in feet.

The loud noise of a flying airplane normally interferes seriously with acoustic devices. Lieut. Delsasso has analyzed the sounds of aircraft, and finds that the beat of the propeller blades against air generates most of the noise. Such beats give mostly low notes in the "bass" range of 20 to 60 vibrations per second, while the motor exhaust, of much less consequence, also registers in the low frequency brackets. The bouncing contact in the Delsasso instrument requires about ten million times as much sound energy to work at 20 vibrations as at 2000. Thus the plane



noises are quite unable to cause false flashes on the dial.

The altimeter will probably be located near the tail of the ship, with two concealed funnels, sending and receiving, pointed downward. Light cloth may cover the funnels to preserve

streamline effects without serious interference with sound. Furthermore, current researches in reduction of airplane noise give hope of making the altimeter still more sensitive, adding many hundreds of feet to the practical working range.

*Science News Letter, May 26, 1934*

## ZOOLOGY

## Twin Chimpanzees Born For First Time in History

**C**HIMPANZEE twins, the first pair on record, have just been reported to the world of science by Dr. Robert M. Yerkes of Yale University's laboratories of Comparative Psychobiology.

The twins, one of them male and one female, were born at the University's Anthropoid Experiment Station at Orange Park, Florida, and are nearly a year old. Dr. Yerkes stated in a report to the current issue of *Science*.

Chimpanzees and other great apes resemble man in that they rarely give birth to more than one infant at a time. Dr. Yerkes and his associates were unable to find a single published report of twin births among the apes. They therefore conclude that the pair born at Orange Park on June 26, 1933, are the first of their kind known to science.

Chimpanzee infants have been exhibited by showman as twins, but Dr. Yerkes has not seen any evidence that would convince him that these really were twins. In one case the showman, when told of Dr. Yerkes' special interest, readily admitted that his pair were not twins.

### Famous Sister

The twins have an eight-year-old sister who has won fame on her own account. She is "the first chimpanzee of dated birth and positively known parentage and life-history to mature sexually in captivity," so far as Dr. Yerkes could find from studying chimpanzee records.

The father of the twins came from Africa and was judged to be eleven years old when the twins were born. Their mother was judged to be twenty years old at their birth. She came to the colony from Havana and is known to have borne two other infants besides the twins and their famous sister. The twins themselves were born somewhat prematurely but were normal and have

developed normally and uneventually.

Nine other seemingly normal births occurred at the chimpanzee colony between September, 1930, and November, 1933, Dr. Yerkes reported. All of the infants except one are now living.

Among the other primates, such as lemurs, gibbons, baboons and monkeys, twin births have occasionally been observed, Dr. Yerkes found. But except for the two he has just reported, no authentic twins are known among chimpanzees, orang-utans or gorillas.

*Science News Letter, May 26, 1934*

## CHEMISTRY

## Heat Treated Wastes Become "Cream" of Oil

**B**Y A "SWEATING" heat treatment of petroleum, called pyrolysis, chemists are now using former oil waste products to make a variety of alcohols highly desired by the lacquer, paint and varnish industry as solvents; a soap which cleans and lathers instantly in salty ocean water; a disagreeable smelling substance to go into the natural gas supply of homes and thereby make possible the quick detection of a leak; and synthetic rubber compounds resistant to gasoline and other rubber solvents.

These new by-products are the "cream" skimmed from the raw "milk" of petroleum, Carleton Ellis of Montclair, N. J., reported to the American Institute of Chemical Engineers.

Chemistry, Mr. Ellis indicated, is attacking the problem of what to do with the many former wastes encountered in the processing of oil for the automotive industry with more than an even chance that a great field of research will be opened, rivalling the hundreds of thousands of dyes and other substances made from coal tar.

Coal tar is the sticky, black ooze left behind after coal is heated in containers and coal gas driven off. From coal tar are obtained hundreds of aniline dyes like indigo; medical preparations such as phenol or carbolic acid; artificial flavoring and important chemical base products like anthracene and naphthalene.

The heat-treating of petroleum not only produces many of the important hydrocarbons found in coal tar on which that giant chemical industry is based but the presence of these hydrocarbons in gasoline, later obtained from the oil, gives the gasoline anti-knock properties which enhance its value as a motor fuel. The ability of chemistry to obtain many alcohols from petroleum will restore grains and natural foodstuffs from the position of contributors to raw industrial sources to their natural position of foods.

"Instead of serving as industrial materials," said Mr. Ellis, "there will be more grain for cattle and cereals, more olive oil for salad dressings, and more vegetable oils for other sorts of cooking. At the moment these prospects may not seem important, but in later years their value should have abundant opportunities to become established."

Ethyl alcohol, he added, will eventually excel all the alcohols in only one field and for one purpose—for drinking.

*Science News Letter, May 26, 1934*

In a national health competition among cities, Baltimore won first place among cities of more than 500,000 population.

The Field Museum has acquired a rare collection of plant specimens gathered in Peru by the first botanists who ever visited that country, 1778 to 1788

### SCIENCE AND THE RECOVERY PROGRAM

an address by

**Dr. A. M. MacMahon**

Curator of the Department of Physics, Museum of Science and Industry

Wednesday, May 30, at 3:30 p.m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.





## VETERINARY MEDICINE

**Anti-Distemper Vaccine  
Used on Huskies of Arctic**

**E**PIDEMICS which in recent years have wiped out husky dogs in many sections of the Canadian northland and threatened the safety of Arctic travelers who must depend on dogs are now being fought with the anti-distemper vaccine-virus and serum developed by Drs. P. P. Laidlaw and G. W. Dunkin of the Field Distemper Council.

Supplies of this material and instructions on how to use it have been furnished by the Canadian Government to Mounted Police, traders, trappers and missionaries. Dr. J. R. West has been in charge of this fight against the epidemics and personally visited all the posts where the annual supply ship stopped, treating the dogs at the posts.

Few dogs, he learned, recover from the disease, which occurs in cycles of about five years. During the height of the spread of the disease dogs may die in as short a time as one or two days with symptoms of the nervous form of distemper. Frequently when the disease attacks the dogs, wild foxes also suffer from a similar epidemic. Even fox farms as distant from the Arctic as Prince Edward Island have suffered from the disease at the same time that it struck the Arctic dogs.

*Science News Letter, May 26, 1934*

## PALEONTOLOGY

**Largest Land Mammal  
Being Mounted at Museum**

**B**ALUCHITHERIUM, a giant rhinoceros and the largest land mammal that has been discovered thus far, is being assembled for exhibition at the American Museum of Natural History. Prof. W. K. Gregory and Dr. Walter Grainger of the American Museum, in a report to the American Society of Mammalogists, described their work on the restoration of this great creature of more than 30,000,000 years ago, which stood over thirteen feet high at the shoulder.

Parts of over twenty-five individuals, collected on the museum expedition to Mongolia, are being sorted and pieced together to make a restoration that will look very different from the only other assembled skeleton in existence, in a Russian museum in Leningrad.

The Russian *Baluchitherium* is made up of more bones from a single indi-

vidual, but has been given a longer neck than the American investigators believe is justified. He has been posed in the position of a giraffe cropping grass with his forelimbs widely spraddled apart.

Dr. Grainger and Prof. Gregory are making their restoration with a shorter neck with the result that it will look much more like a rhinoceros.

A curious parallel to the structure of the giant dinosaur *Diplodocus* was found in the great cavities on the sides of each vertebra.

One of the *Baluchitherium* specimens found in the desert of Gobi had evidently become mired in quicksand and was left in a standing position for millions of years. Unfortunately excessive weathering had eroded away all the upper part of the body, so that only the four legs and feet were recovered.

*Science News Letter, May 26, 1934*

## WILD LIFE ADMINISTRATION

**ECW Operations To  
Halt Bear Raids**

**B**EAR RAIDS may or may not be stopped in "the Street," but ECW workers are determined that they are going to be halted in "the Park."

For many years, the black, brown and cinnamon bears have played the role of robber barons in the tourist camps of Yellowstone National Park. Auto tourists who pitch their tents and trustingly leave the sugar and bacon where bears can get at them (and that means almost anywhere) have at times had their slumbers disturbed by blundering hungry Bruins—and found themselves breakfastless in the morning. It does not happen often, but it is plenty annoying when it does.

Now the emergency conservation workers are about to build bomb-proofs, or rather bear-proofs, for the campers' supplies. They will be solid, concrete-and-iron affairs, affording shelter from the elements as well as protection against the paws and jaws of marauding bears.

A special problem will have to be faced in the matter of door fastenings, for a bear's combination of brute strength and almost rodent-like persistence is more than a match for most locks.

The first installation of the bear-proofs is to be made at Old Faithful Camp. If the shelters function successfully, similar ones will be erected in other camps.

*Science News Letter, May 26, 1934*

**IN SCIENCE**

## MEDICINE

**Digestive System Lack  
May Cause Deficiency Ills**

**A**LL THE vitamins in the world will not keep you healthy if your digestive system is deficient and fails to react properly with the vitamins. This theory was advanced by Dr. William B. Castle of Harvard Medical School in the Herbert Swift Carter Memorial lecture at Columbia University.

In "deficiency" diseases, like pernicious anemia, beriberi or pellagra, the deficiency may be in the diet which lacks some essential substance or it may be in the digestive organs themselves. This theory would account for the occasional development of a disease like pellagra in persons eating a diet containing plenty of the pellagra-preventing vitamin G, for example.

In pernicious anemia the deficiency is in the digestive tract which does not react properly with the food; in another type of anemia associated with the tropical disease, sprue, the deficiency is usually in the diet, Dr. Castle explained.

*Science News Letter, May 26, 1934*

## PUBLIC HEALTH

**Wants "White Wings" To  
Wear Another Color**

**"W**HITE wings," those white-uniformed public servants who clean the city's streets, will change their plumage for another color, if the recommendations of Dr. Bernard Sachs, president of the New York Academy of Medicine, are adopted.

White is no color for anyone working in the streets to wear, Dr. Sachs declared. Refuse carts and cans should be painted a drab green or some other drab color, he holds, and presumably the street cleaners' "white wings" should be exchanged for similar dull tones.

Dr. Sachs reviewed the accomplishments of the Committee of Twenty on Streets and Outdoor Cleanliness.

*Science News Letter, May 26, 1934*



# SCIENCE FIELDS

## ETHNOLOGY

## Scalped Indians Who Survived Were "Ghosts"

**T**O BECOME a ghost—a dead man in the eyes of your family and neighbors—this was the tragic fate of an Arikara Indian who survived scalping.

The plight of these living ghosts of the Great Plains is told by Dr. Melvin R. Gilmore of the University of Michigan, in a report to the Michigan Academy of Science, Art and Letters.

No warrior would knowingly scalp a living man, says Dr. Gilmore. But in the confusion of battle an apparently dead enemy might have his scalp lock taken. He would later awake to find himself in the paradoxical position of being alive, yet rated dead by his people. The sight of him thereafter would have been a shock and an offense to the living.

Living scalped men had to become hermits, foraging for food and supplies mostly after dark, and entirely without help from friends or relatives.

Dr. Gilmore has learned of the experiences of two such Indians, one of whom managed to hold secret meetings with his wife.

*Science News Letter, May 26, 1934*

## BACTERIOLOGY

## Milk Keeps Better After Ultraviolet Irradiation

**M**ILK that has been irradiated by exposure to ultraviolet light keeps longer, has a slightly lower bacterial count and lower acidity than has ordinary whole milk.

This added keeping quality of irradiated milk has been proved through research work done during the past year by K. G. Weckel and H. C. Jackson of the University of Wisconsin. They found that at refrigerator temperatures irradiated milk will keep several hours longer than whole milk not so treated. This added keeping quality is partly due, the experiments show, to a very slight reduction in the development of acidity of the milk after irradiation.

Irradiation also causes a slight reduc-

tion in the bacterial count in milk, but the process has no specific effect on some of the most important milk bacteria, namely the lactic acid, gas-forming and coagulating types. This seeming contradiction is explained by the fact that the exposure of the milk to the ultraviolet light is for such a short period, and that the opaqueness of the milk furnishes a protective film against the light rays.

In high quality milk of low bacterial count the percentage of bacterial reduction by irradiation was found to be very low. But in poorer quality milk, high in bacteria, the reduction was somewhat higher. In neither case was the bacterial reduction great enough to indicate that the reduced acidity in irradiated milk was caused by the smaller number of bacteria. Many large and small milk plants have during the past year installed machinery to produce irradiated whole milk.

*Science News Letter, May 26, 1934*

## MEDICINE

## Hay Feverites Warned Of Certain Insecticides

**H**AY FEVERITES who owe their suffering to the ragweed pollens should keep away from insecticides made from pyrethrum, warns Dr. Samuel M. Feinberg of Chicago. Among the household insecticides of this kind he mentioned Black Flag and Flit.

Out of 225 persons who start sneezing when the late summer breezes blow ragweed pollen about, 104 were sensitive to commercial pyrethrum, skin tests showed. Insect powders and sprays containing pyrethrum may bring on attacks of hay fever in these persons outside the ragweed season, Dr. Feinberg reported to the American Medical Association.

Pyrethrum flowers are distantly related to the ragweeds. Commercial pyrethrum seems to be capable of making trouble for the unwary in three different ways, Dr. Feinberg pointed out. One part of it, which is the agent that kills insects, is poisonous when taken by mouth. Another part may cause skin irritation in persons handling it, gardeners or those working in the factories where the insect powders and sprays are made. The third part is what scientists call an allergen, and this is the part that can produce an attack of hay fever in a sensitive person who is unlucky enough to get it up his nose.

*Science News Letter, May 26, 1934*

## SEISMOLOGY

## Three Quakes in 36 Hours Keep Seismographs Busy

**T**HREE earthquakes in less than thirty-six hours kept seismographs busy more than halfway round the world on Sunday, May 13 and Monday, May 14, reports received by Science Service and deciphered by scientists of the U. S. Coast and Geodetic Survey indicate.

The strongest shock of the three occurred west of Seward, Alaska, on Monday at 5:13.2 p. m., Eastern Standard Time. The epicenter was determined as in approximately 60 degrees north latitude, 151 degrees west longitude. An earthquake had been registered from the same general region ten days before.

On the same day, at 8:15 a. m., Eastern Standard Time, a moderate earthquake took place near the western edge of the Gulf of California, in latitude 28 degrees north, longitude 113 west.

The third quake could not be located exactly, because it was not reported by a sufficient number of stations. The Coast and Geodetic Survey scientists, however, stated that it had probably centered somewhere under the floor of the South Pacific Ocean.

*Science News Letter, May 26, 1934*

## MEDICINE

## Vitamin C May Aid Body To Fight Tuberculosis

**V**ITAMIN C, the scurvy-preventing constituent of many fresh fruits and vegetables, may help the body in fighting tuberculosis, it appears from studies reported by Drs. Eugene de Savitsch and his associates, J. D. Stewart, Louise Hanson and E. N. Walsh, of Chicago, at the meeting of the National Tuberculosis Association.

Guinea pigs given about a third of an ounce of freshly prepared orange juice daily were better able to withstand the disease induced by fatal doses of tubercle bacilli or germs than pigs equally infected with tubercle bacilli but not getting orange juice.

The study was undertaken in order to determine whether the peculiar resistance of rats to tuberculosis is correlated to the fact that they can manufacture their own vitamin C and need not depend on a dietary source of this vitamin.

No suggestion of immediate application of the studies to the treatment of tuberculosis in man was made.

*Science News Letter, May 26, 1934*



CHEMISTRY

# Riches From the Sea

**Gold in the Sea, Although Real Enough, Will Not Yield Wealth, But Extraction of Bromine is Practical Pursuit**

By DR. FRANK THONE

See Front Cover

**G**OLD! That word of more-than-magic excitation has lured men by the millions, to frozen Klondikes, across burning deserts to Californias, over stormy seas to Australias and Transvaals, through countless ages to countless Eldorados and Golcondas. Not without cause did the Romans depict the goddess Fortuna with long locks of golden hair.

So when the American public got itself all excited over the announcement, at the recent meeting of the American Chemical Society in Florida, that the old hope of getting gold out of sea water had been made new again, it was only reacting in an entirely human and normal fashion. Golden pavements for all North America, golden dollars like seashore sands—it sounded like an apocalyptic dream of the New Jerusalem. Bankers might be worried if such a dream were in immediate prospect of coming true; there can be such a thing as too much gold—a permanent inflation on a gold basis. Just what *would* happen to the world's markets if gold became as common as copper? H. G. Wells please answer: here's a theme for a novel quite to your liking!

But one shouldn't become too excited over the prospect of practically unlimited gold squeezed out of the waters of the sea. There's no immediate promise of its becoming a fact, alluring or alarming though the dream may be. And in the meantime, the ocean really is yielding treasure of far more immediate importance in our daily lives and labors and enjoyments than anything the Forty-Niners or Klondikers or other treasure seekers as far back as Jason ever dreamed about.

## From Ocean to Auto

If your car started without too much fuss during the cold weather of the end

The illustration on the cover of this week's SCIENCE NEWS LETTER shows the inlet where the water pours in to the bromine plant.

of this past winter, if it purrs along without knocking now that spring beckons to the country highways, credit that to a few drops of Extract of Ocean that have been mixed with the gasoline in your fuel tank. That is, you may do so if you use any of the numerous brands of ethyl gasoline, which almost everybody does nowadays.

When we speak of the tetra-ethyl-lead in modern motor fuel, with a sense of satisfaction of having mastered at least one of those many-jointed tough chemical terms, we are even at that omitting to give due credit to one important element, bromine, for its part in the chemical magic that makes the motor go—something much more important than the much-quoted money that makes the mare go. (Who drives a mare any more nowadays, anyway?) In the making of tetra-ethyl-lead, one of the indispensable ingredients is ethylene dibromide; and it is bromine for the making of this compound that men are now actually extracting from the sea, whereas they are only beginning to think seriously about trying to get sea-gold.

## Adventuring in the Laboratory

The extraction of bromine from sea water is easily as romantic a tale as any romance that was ever woven about the

Argosy of pre-history's dim mists or the Alaska of our hard-sinewed fathers' time. The adventurers were of the same breed of keen, audacious Americans, though their adventuring was done in the chemical laboratory and the engineers' construction shack rather than on the high seas or across frozen mountains. And their adventuring, moreover, had the sharper salt of the heroic in it, in that it was forefigured and sharply aimed at the aversion of a rapidly looming famine in one needed commodity, whose lack would have lamed cars and trucks and all other automotive traffic everywhere.

## A Revolution

The invention of ethyl gasoline and its rapid adoption by the driving public wrought a veritable revolution in one American chemical industry. In 1924 the production of free and chemically combined bromine in this country amounted to approximately two million pounds. In 1931 this quantity had risen to about nine million pounds, all of which was being produced from natural brines and from seawater concentrated by evaporation. The demand for bromine was becoming so great that it had become perfectly evident that the sources then in use could not possibly keep it supplied. New sources simply had to be found.

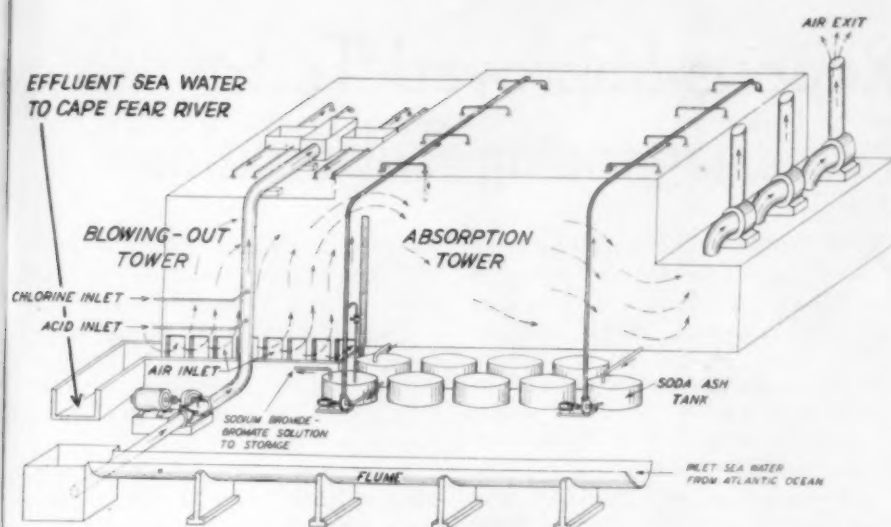
Chemists knew there was bromine in the sea. But it was there in exceedingly thin solution—in a million pounds of sea water less than 70 pounds of bro-



FROM ABOVE

General view of the first industrial plant built to rob the sea of its mineral wealth.





#### HOW THE PLANT WORKS

The diagram gives an idea of the steps through which the water goes while it is being robbed of its bromine, and what happens to the bromine afterwards.

mine. No method known a few years ago could get it out cheaply enough to make it pay. Several pioneer efforts, one of them made in a ship that was a floating factory, failed to find a really satisfactory answer to the challenge of the bromine-hoarding sea.

Yet the challenge of Old Ocean could not be ignored. He had so much of this absolutely necessary element in his clutching wet fingers! How could he be forced to loose his hold?

#### The Secret Found

One of the most successful of American chemical manufacturing firms, the Dow Chemical Company, turned the batteries of its research chemists' wits on the problem. The secret was at last found: sea water hangs onto bromine because it is slightly alkaline. Make it acid, and it is willing to let go. The actual letting go is accomplished by adding to the acidified sea water a little chlorine—one part of chlorine for every part of bromine present. Chlorine, a chemical first cousin of bromine, is a "stronger" element: it can pry bromine loose from almost any combination in which it is a part, taking its place in the combination and letting the bromine drift out as a free gas.

All this the chemists learned in the laboratory, first with synthetic sea water which they mixed up themselves, then with tank carloads which they had shipped in from the Atlantic Ocean. They found also that the free bromine could be blown out of the water simply by shooting a strong stream of air

through it. The bromine could be recaptured from its mixture in the air by passing it through a strongly alkaline solution of soda ash, and then released again by acidifying that solution and warming it. The finally freed bromine could then be captured as the pure element.

All this was demonstrated in the laboratory. When the company sought for a site where it could be put into profitable operation on a large scale, they combed both coasts of the country. The right place had to be as remote as possible from the outlets of large rivers that would dilute the incoming supply of sea water. It had to be free from sewage and industrial pollution. It had to provide some means of disposing of the vast quantity of waste water after the bromine had been removed. Preferably, it should be in a warm-water region, because warm water will give up its bromine more readily than cold.

#### River Takes the Waste

All these requirements were met finally on a narrow peninsula a little above the mouth of the Cape Fear river, a few miles below Wilmington, N. C. By cutting a canal across the peninsula, the pure sea water could be brought to the plant on one side, and the spent water discharged into the river on the other, with no danger of mixing with the supply.

Having decided on their site, the company moved decisively and fast. On July 27, 1933, they began clearing the land. On August 14 the first working

drawing was completed, and on the next day the first building operations were begun. On January 10, 1934, the production of ethylene dibromide was under way; the plant, with a rated capacity of 15,000 pounds of bromine a day, is now working at 101 per cent. of that capacity—actually making more bromine than it is supposed to be able to make! The whole is a monument to the drive and energy of one industrial firm during times when many businessmen are still sitting on the dustheap of depression and wringing their hands over the hopelessness of the times. Incidentally, the undertaking "made jobs," too, at a time when jobs were needed: at one period they had 1500 men at work, and the whole task absorbed 90,000 man-days of labor.

#### Plant Simple

The working of the plant is practically as simple as that of its small laboratory prototype, but on an enormously greater scale. The machinery is titanic, for it must handle a veritable river of sea water, kept flowing all the time by a pair of gigantic pumps with a combined capacity of 56,000 gallons a minute, driven by a pair of 300-horsepower motors. These suck in the water from an inlet protected by a pair of piling-strengthened dikes, and hurl it over a concrete dam into the canal that carries it across the peninsula. In summer it is permitted to linger in a broad pond where it is still further warmed by the sun; in winter it gets no such basking period. The engineers have cleverly taken advantage of labor done before them: in one place utilizing an old Civil War trench, in another using as a kind of settling basin one of the strange elliptical depressions common in the Carolinas and believed to have been left ages ago by the impact of a shower of huge meteorites.

In the extraction plant, the water is thrown vertically upward through a great rubber-lined pipe 42 inches in diameter. Part way up, sulphuric acid is injected into it, and a little above this point, the chlorine that dislodges the bromine. Then the water, with its bromine all loose and ready to come out, encounters the counter-current of air. Out comes the bromine, and away it sails in the air. This carries it through a long series of soda-ash brine tanks, where it is recaptured. The bromine is released again by acidification and warming and now condensed in its pure state.

In the meantime, in a separate establishment, pure alcohol is being evap-



orated and passed over a very fine porcelain clay known as kaolin. This breaks it up into ethylene gas, and this gas is mixed with the bromine to form pure ethylene dibromide. This final product of the treasure-from-seawater factory is packed in steel drums and loaded into the company's boat, the Ethyl Dow, for its short voyage up river to Wilmington and thence out to the wide world's highways and their endless appetite for ethyl gasoline.

The company's chemists and officers have made man's first direct profits out of sea water. They are as yet extracting only one of the many things it contains; for there are in sea water, besides bromine, such elements as gold, silver, copper, nickel, cobalt, lead, strontium, tin, phosphorus and many others, including even radium. All of these, some in known quantities, some in unknown, are daily pumped into the company's plant and allowed to flow back into the sea, simply because nobody has any idea how to extract them. It is like standing on the bank of a river crowded with all kinds of good fish, equipped with a net that will catch only herring. Herring are good—but it's a shame to see all the others getting away, since we have the river anyway, all bought and paid for. The Dow chemists feel that if even a very small quantity of any of these valuable elements could be extracted from the same water as a by-product, it would be just that much "velvet."

Naturally, their thoughts turn first to the gold, though that is present only in a few parts per billion, instead of about 70 per million, as the bromine is. Even if they got the gold, the bromine they are already sure of is worth twelve or fifteen times as much. Nevertheless, the age-old human hankering for the yellow metal asserts and reasserts itself.

And what though nobody has the least idea about how to go after it? Ten years ago nobody had much of an idea how to go after the bromine. Maybe, ten years hence—who knows?

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A Canadian scientist says: "In spite of the fact that weeds probably cost us more than plant diseases, animal diseases and insect pests combined, we left them to be the last of the pests of agriculture to occupy serious attention as a subject of scientific investigation."

# MEDICINE

## Reports Improved Tests For Diagnosing Tuberculosis

**A**N IMPROVED test for tuberculosis, discovery that the disease is less prevalent in the United States than generally supposed, improvement in taking X-ray pictures of tuberculosis patients—these are the major advances in the fight against the white plague discussed at the meeting of the National Tuberculosis Association.

The improved diagnostic aid is a new kind of tuberculin used to detect the presence of tuberculosis. One difficulty with tuberculin tests in the past has been the fact that a number of different kinds of tuberculin were used. Not all of them were reliable. Tested with one product, a person might be found free from tuberculosis whereas a test made with another tuberculin might show the presence of tubercle bacilli in his system.

The new tuberculin, prepared by Dr. Florence Seibert of the University of Pennsylvania and the Henry Phipps Institute, Philadelphia, was described at the meeting by Dr. Esmond R. Long of the same institution. This tuberculin is considered more accurate and otherwise superior to any of the products previously used.

The Medical Research Committee of the National Tuberculosis Association has persuaded two drug firms to manufacture this product and hopes to have it universally adopted for tests. This would make the diagnosis of tuberculosis more certain. It would also enable health officials to determine accurately the amount of tuberculosis throughout the country.

Tuberculin tests sift out the persons who have tuberculosis from those who have not. But after the disease has been diagnosed further examinations must be made to determine the extent of the disease and the kind of treatment needed.

Most important in this respect is the X-ray picture. Here again wide variations in the way the pictures were taken made it difficult for physicians to compare pictures and judge the extent of the disease. The Medical Research Committee, under the chairmanship of Dr. William Charles White of Washington, has sponsored research to improve

X-ray picture taking and is trying to have the improved method here also made standard throughout the country.

Tuberculin tests are already being made on a large scale, Dr. Long reported. An entirely new view of the situation in the United States has appeared as a result.

Fewer persons are infected with the tubercle bacilli, with or without symptoms of actual disease, in the West than in the East. The number of persons so infected is steadily decreasing in both sections.

Contrary to general belief, very many adults are entirely free from tuberculous infection. It used to be thought that by the time a person had grown up, he had many tubercle bacilli or germs in his body, the result of picking up a few at a time from chance contact with tuberculosis patients. Because he got the germs in small, repeated doses, he developed a resistance to them which kept him from getting ill with tuberculosis. The tests now being made in schools and colleges all over the country indicate that adults generally are not infected with the tuberculous germs.

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# ASTRONOMY

## MacDonald Observatory Disc Not Damaged

**R**EPORTS that the glass disc of the mirror of the MacDonald Observatory has been damaged during manufacture at Corning, N. Y., are erroneous, Dr. Otto Struve, director of the MacDonald and Yerkes Observatories, has informed Science Service.

The incorrect report probably arose because it has been decided for greater safety to repeat the process of slow cooling or annealing, thus giving the glass the benefit of two annealings. The glass is of excellent mechanical quality, Dr. Struve said, and relatively free from bubbles and other defects.

The MacDonald Observatory is being erected in Texas by the University of Texas, and it will be operated jointly with Yerkes Observatory.

Science News Letter, May 26, 1934



## ASTRONOMY

# Stellar System of Stars Likened to Swarm of Bees

**T**HE MAN who has probably seen and probed more of the universe than any other person, Dr. Edwin Hubble of the Carnegie Institution's Mt. Wilson Observatory, presented the following word-picture of the universe to the National Academy of Sciences:

On the grand scale, we may picture the stellar system, the system to which our sun belongs, drifting through the universe like a swarm of bees drifting through the air. From our position somewhere within the system, we look out through the swarm of stars, past the borders, into the universe beyond.

It is empty for the most part—vast stretches of empty space. But here and there, at immense intervals, we find other stellar systems, comparable with our own. They are so distant that in general we do not see the individual stars. They appear as faint patches of light and hence are called nebulae.

The nebulae are great beacons scattered through the depths of space. We see a few that appear large and bright. These are the nearer nebulae. Then we find them smaller and fainter in constantly increasing numbers and we know we are reaching out into space farther and even farther until, with the faintest nebulae that can be detected with the greatest existing telescope, we have reached the frontiers of the known universe.

This last horizon defines the Observable Region—the region of space that can be explored with existing telescopes. It is a vast sphere, some 600,000,000 light years in diameter, throughout which are scattered 100,000,000 nebulae.

Further radical advances in cosmology will probably await the accumulation of more observational data—the elimination of more types of possible worlds. The data will come either from detailed investigations of the present Observable Region or from a significant enlargement of the region itself.

The latter alternative will be achieved with the 200-inch reflector in course of construction for the California Institute of Technology with the assistance and cooperation of the Carnegie Institution of Washington. This great telescope, in the hands of experienced research men

in the two institutions, is expected to enlarge the available sample of the universe some ten times in a single step and will increase in a corresponding measure the chances that our sample is fair and significant.

Our present information concerning the universe is necessarily vague. It is new and raw and will mature only with time and continued study. The great significant feature is that the first steps have actually been achieved—that in our generation, for the first time, the structure of the universe is being investigated by direct observations.

*Science News Letter, May 26, 1934*

## GENERAL SCIENCE

## Astronomer and Chemist Receive Franklin Medals

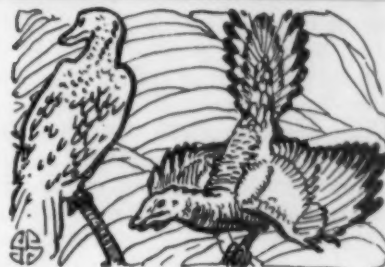
**P**ROFESSOR Henry Norris Russell, Princeton astronomer, and Dr. Irving Langmuir, General Electric Co. chemist and recent Nobel laureate, were awarded the Franklin Institute's Franklin Medal at its annual meeting.

Among the other awards were Wetherill medals given to Dr. Johann B. Ostermeier of Augsburg, Germany, and to Prof. E. Newton Harvey, of Princeton, and Alfred L. Loomis, banker-scientist of Tuxedo Park, N. Y. The latter two were honored for their joint invention of the centrifuge microscope, one of the most powerful of the newer tools for scientific research.

The centrifuge microscope is an instrument in which the specimen to be examined is whirled on the end of a high-speed rotor, which imitates the effect of a greatly increased force of gravity. A light is arranged so as to illuminate it with a brief flash at one point of each rotation, and during these succeeding flashes it can be looked at with a microscope, so that events may be watched while they happen. The centrifuge microscope was developed by the two men in Mr. Loomis' private laboratory.

*Science News Letter, May 26, 1934*

Government scientists are trying out a new poisoned bait on the grasshoppers that infest Midwestern fields this year.



Writ In Clay

**H**OW MUCH of our knowledge of the past we owe to mud!

One of the two oldest known civilizations, that of Mesopotamia, left us practically all of its records imprinted on clay tablets in the curious "hen-track" script we know as cuneiform, or wedge-writing. And from the clay-made pottery of early peoples in all parts of the earth, ranging from the crude jars of Mound-builder Indians to the painted vases of the Greeks and the exquisite porcelains of the old Chinese dynasties, we gain light on the culture and attainments of the peoples who made them.

But older than these, older than anything human, old as any life on the earth, are other records writ in clay. Dinosaurs stamped their huge feet into moist mud, dragged their trailing tails across it. The clay dried out in the sun, hardened, was buried under fresh layers brought by the next flood, and after long ages turned to stone. Now we can split off slabs of it and see where these lumbering reptiles walked. Lesser footprints, of salamanders, insects, scorpions, snails even, are similarly preserved for us from remotest ages.

Not only are the writings of hands (and feet, and tails) preserved in hardened clay, but sometimes the images of the writers themselves. A common type, perhaps the commonest type, of fossil is what paleontologists call a "cast." In such a fossil, no trace of the internal structure of the bone or other hard part of the dead animal remains. All it left, as it decayed rather rapidly, was a hollow in the mud that covered it, and into this hollow slowly filtered fine-grained silt that filled it up, marking itself off from the surrounding "matrix" stone by differences in fine-



ness, in color or in material. Such casts give us images of the external shape of bone, scale, horn—sometimes even skin and feather.

The finer the clay the finer the detail in the cast. Probably the most perfect fossil cast, certainly the best known one, is the famous cast of *Archaeopteryx*, the toothed, long-tailed primitive bird found, complete even to prints of its feathers, in a slab of lithographic stone from Central Europe.

The ooze into which that dying bird fell, millions of years ago, was so fine-grained that the stone into which it has hardened will register and reproduce

the thinnest of lines that can be drawn upon it with a lithographer's pen. This extreme fineness of grain has made it possible for scientists to study the skeleton and feathers of this long-gone bird species almost as though they had before them the bones and feathers of a crow killed a few days ago.

Good enough for the dinosaurs were the coarse shales and sandstones of our rude west, of the wild plains of Mongolia. *Archaeopteryx*, writing his own epitaph with his own plumes, demanded—and received—a much daintier entombment.

*Science News Letter, May 26, 1934*

#### AGRICULTURE

## United States Need Not Fear Famine Even With Drought

**D**ROUGHT or no drought, Americans will not have to face famine this winter. The "carry-over" of wheat, corn and other basic foodstuffs, added to even a short crop, insures ample supplies. And should the worst imaginable befall, and no food whatever be raised in this country this year—something quite impossible, short of a veritable Devil's miracle—there is already sufficient in the pantry to live on.

A survey of the situation, based on latest data available at the U. S. Department of Agriculture, piles up some impressive figures.

The quarterly report of stocks of wheat on farms, together with private figures, leads to an estimate of 386,000,000 bushels for total wheat stocks

as of April 1 this year, compared to 528,000,000 bushels last year and 521,000,000 bushels average for the past three years.

Estimating and deducting the amount to be used at home and set aside for export until July 1 suggests that the carry-over at that time will be 250,000,000 to 275,000,000 bushels. This compares with 397,000,000 bushels a year ago and a five-year average of 285,000,000 bushels.

The new winter wheat crop is estimated at May 1 at 461,000,000 bushels. No estimate can be made as yet for spring wheat, because it is not all planted. Last year the spring wheat crop was 176,000,000 bushels. Assuming that the crop is the same size this

year (which is doubtful if the present drought continues) that would give a total supply for next year as follows: Carry-over 266,000,000 bushels, winter 461,000,000 bushels, spring 176,000,000 bushels, or a total of 903,000,000 bushels.

The total disappearance of wheat for food, feed, etc., was estimated at 620,000,000 bushels last year, 666,000,000 bushels in 1932, and 684,000,000 bushels in 1931, assuming 625,000,000 bushels for next year would leave 278,000,000 bushels for export and carry-over. The total exports during the years 1929-32 averaged less than 150,000,000 bushels per year, in 1933 they were 44,000,000 bushels and declined still more in 1933-34.

This would leave us with a carry-over next year about as large as this year.

The stocks of corn on farms on April 1 amounted to 834,000,000 bushels, compared with 1,123,000,000 bushels in 1933 and 913,000,000 bushels in 1932.

Stocks of oats on farms on April 1 were 271,000,000 bushels, compared to 468,000,000 in 1933 and 365,000,000 in 1932. Oats are, therefore, relatively considerably below recent years.

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#### ENGINEERING

## Hair Not Good Material For Test of Razor Blades

**T**HE TIME-honored morning rite of plucking out a hair and testing a razor blade on it has been investigated by science, and found wanting.

Hair is too irregular to be good test material. So T. S. Fuller and Dr. W. R. Whitney of the General Electric Company's Research Laboratory discovered, in seeking a thread or fiber for razor blade tests.

An eight-inch hair varies as much as 340 per cent. in its cross-sectional area. While even poets rarely wear hair this long, the figure gives an idea of how inexact the hair test is.

The laboratory investigators made a standard fiber of raw silk strands twisted in a certain way, for their tests. The "sharpness tester" apparatus which they have devised is described as purely a developmental and not a commercial device, to check up on the performance of blades.

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# ●First Glances at New Books

## Exploration

**HOW PEARY REACHED THE POLE**—Donald B. MacMillan—*Houghton Mifflin*, xii+306 p., \$3. In these airplane days, when the North Pole is hardly more than a suburb, it is hard to realize that men still living (and not old men, either) took part in this epic of slow, dogged, battling march northward to the place where there is no north. The premium in exploration now is on iron nerve and instant alertness; but in the days when our younger fathers did with their own sinews what we now do with steel machines, they also were men!

*Science News Letter*, May 26, 1934

## Bacteriology

**YOUR GERMS AND MINE: THE STORY OF GOOD AND BAD MICROBES**—Berl ben Meyr—*Doubleday Doran*, 389 p., \$2.75. The practical point of view as well as the readable style will make this book particularly appealing to the lay reader. A noteworthy feature is the inclusion of "good microbes" which are not often discussed in non-technical books of this type. A glossary of terms and numerous specially-drawn illustrations add to the clarity of the text.

*Science News Letter*, May 26, 1934

## General Science

**THE WORLD AROUND US**—S. R. Powers, Elsie F. Neuner and H. B. Bruner—*Ginn*, xix+475 p., \$1.20. A well-planned text in general science for junior high school pupils, consciously aimed at its audience in both idea-content and in vocabulary.

*Science News Letter*, May 26, 1934

## Biology

**NEW BIOLOGY**—W. M. Smallwood, Ida L. Reveley and Guy A. Bailey—*Allyn and Bacon*, 636 p., \$1.80. Teachers who are looking for a general text that will be useful in their Freshman classes will do well to investigate this book. Particular stress is placed on the integration of Man with the rest of the living world, and its significance in his daily struggle to gain a living and escape destruction, just as all of his kin-creatures do.

*Science News Letter*, May 26, 1934

## Nursing

**SURVEY OF PUBLIC HEALTH NURSING**—National Organization for Public Health Nursing—*Commonwealth Fund*, 262 p., \$2. This report gives a very complete picture of the present status of public health nursing in this country

and makes specific recommendations for the future. The report stresses the importance of cooperation between public health nursing organizations and lay groups in the community, and consequently should be read by many persons outside the nursing and public health professions, such as leaders of civic, church and women's organizations interested in promoting the health of the community.

*Science News Letter*, May 26, 1934

## General Science

**MAN AND THE NATURE OF HIS PHYSICAL UNIVERSE**—F. C. Jean, E. C. Harrah, F. L. Herman and S. R. Powers—*Ginn*, x+524 p., \$2.20. A general text designed for use by beginning college students. Treatment proceeds from the cosmos as a whole, through physics and chemistry and their applications, to the earth sciences and their importance to man.

*Science News Letter*, May 26, 1934

## Agriculture-Chemistry

**COMMERCIAL FERTILIZERS, THEIR SOURCES AND USE**—G. H. Collings—*Blakiston*, xiv+356 p., \$3.50. A compact but comprehensive textbook intended for college use; useful, however, as a reference work in many places remote from the classroom.

*Science News Letter*, May 26, 1934

## Ichthyology-Anatomy

**THE ELASMOBRANCH FISHES**—J. Frank Daniel—*Univ. of California Press*, 332 p., \$5. The third edition of a book which has become so thoroughly established that nobody considers offering a course in comparative vertebrate anatomy without having it on the reference shelf.

*Science News Letter*, May 26, 1934

## Animal Pathology

**A MALARIA-LIKE DISEASE OF DUCKS CAUSED BY *Leucocytozoon Anatis* WICKWARE**—Earl C. O'Roke—*Univ. of Michigan Press*, 43 p., 5 pl., 25c. Important directly to poultry keepers and game conservationists, and to medical scientists and parasitologists for use in comparative studies.

*Science News Letter*, May 26, 1934

## Natural History

**BOB FLAME—RANGER**—Dorr G. Yeager—*Sears*, 295 p., \$2.50. This book describes the first year's experiences of a young permanent ranger in Yellowstone National Park. Announced as a juvenile for boys from 14 to 18, it is, however, of interest to all lovers of the outdoors. The author, who is now Park Naturalist in Rocky Mountain National Park, Colorado, was for several years stationed in the Yellowstone and knows his subject thoroughly. All the experiences of Bob Flame and the other rangers actually have happened, although names are fictitious and places of occurrence are disguised. *Bob Flame—Ranger*, has been selected by the Junior Literary Guild as the Book of the Month for May.

*Science News Letter*, May 26, 1934

## National Parks

**ACADIA NATIONAL PARK**—National Park Service. *Govt. Print. Off.* A new pamphlet on the oldest national park in the East, illustrated. May be obtained free upon application directly to the National Park Service, Washington, D. C.

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## Chemistry-Physics

**REUNION INTERNATIONALE DE CHIMIE-PHYSIQUE, 1933: L'EFFET VOLTA**—Emmanuel Dubois, 20 p., 6 fr.; **THE ELECTRICAL PROPERTIES OF SEMI-CONDUCTORS AND INSULATORS**—M. A. H. Wilson, 14 p., 4 fr.; **ON PHASE BOUNDARY POTENTIALS**—Eric Keightley Rideal, 17 p., 4 fr.; **PILE METALLICHE CHE FUNZIONANO IN ECCEZIONE ALLA LEGGE DELLE TENSIONI ELETTRICHE NEI CIRCUITI METALLICI**—O. Scarpa, 20 p., 6 fr.; **DAS ELEKTROLYTISCHE KRISTALLWACHSTUM**—M. Volmer, 12 p., 4 fr.; **LES ELECTRONS DANS LES METAUX, PROBLEMES STATIQUES MAGNETISME**—F. Bloch, 20 p., 5 fr.; **CONDUCTIBILITE ELECTRIQUE DES ISOLANTS SOLIDES ET DES SEMI-CONDUCTEURS**—A. F. Joffé, 35 p., 10 fr.; **LES ELECTRONS DANS LES METAUX DU POINT DE VUE ONDULATOIRE**—Léon Brillouin, 32 p., 9 fr., Hermann et Cie. Paris.

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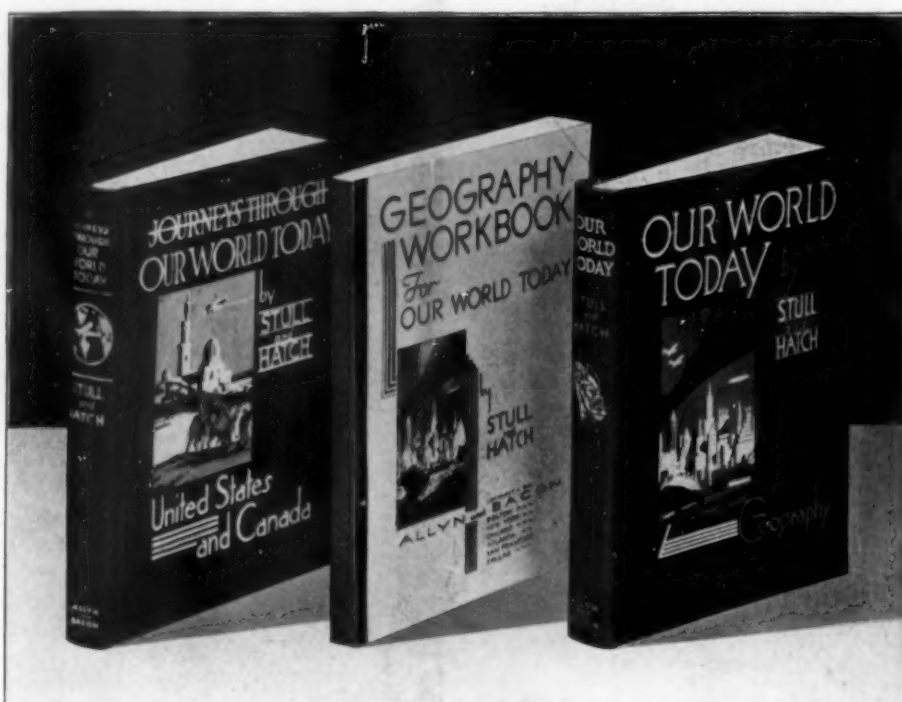
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